

WHAT IS CLAIMED IS:

1. A stent for holding open a blood vessel formed of a plurality of triangular cells, each triangular cell comprising:

a first loop containing section, the first loop containing section arranged generally in the circumferential direction;

a second loop containing section joined to the first loop containing section at a first junction point; and

a third loop containing section joined to the first loop containing section at a second junction point and joined to the second loop containing section at a third junction point.

2. A stent according to claim 1, wherein the first loop containing section is relatively adapted to enable radial support, and the second and third loop containing sections are relatively adapted to enable longitudinal flexibility.

3. A stent according to claims 1 or 2, wherein the first loop containing section has wider struts than the second and third loop containing sections.

4. A stent according to claim 3, wherein the first loop containing section has two loops.

5. A stent according to claim 4, wherein the second loop

containing section has two loops.

6. A stent according to claim 5, wherein the third loop containing section has two loops.

7. A stent according to claim 6, wherein the stent is made of stainless steel.

8. A stent according to claim 7, wherein at least one of the legs for a loop of the first loop containing section is shorter than other legs for a loop of the first loop containing section.

9. A stent according to claims 1 or 5, wherein the second and third junction point are circumferentially aligned.

10. A stent according to claims 1 or 2, wherein each cell in the stent encompasses the same area.

11. A stent according to claims 1 or 2, wherein the cell is arranged so that when expanded a length of the cell along a circumference of the stent is longer than a length of a cell along the longitudinal axis of the stent.

12. A stent according to claims 1 or 2, wherein the stent is

made from NiTi.

13. A stent according to claim 12, wherein a cell of the stent is symmetrical about a line parallel to a longitudinal axis of the stent.

14. A stent according to claims 1 or 2, wherein at least one cell with a larger size is provided to allow access to a side branch lumen.

15. A stent according to claims 1 or 2, wherein the cells are arranged into a plurality of bands, and the cells in one band are larger than the cells in the remaining band so as to provide access to a side branch in a vessel.

16. A stent according to claims 1 or 2, wherein the cells are arranged into a plurality of bands and the cells in at least one band are adapted to have a different radial force than the cells in the remaining bands.

17. A stent according to claims 1 or 2, wherein the cells are arranged into a plurality of bands and the cells in at least one band are adapted to have a different longitudinal flexibility than the cells in the remaining bands.

18. A stent according to claims 1 or 2, wherein the cells are arranged into a plurality of bands and the cells in at least one band are adapted so that upon expansion of the stent the band expands to a diameter which is different than the diameter of the remaining portions of the stent.

19. A stent according to claims 1 or 2, wherein the cells are arranged into a plurality of bands, and the number of cells in at least one band is different than the number of cells in another band.

20. A stent according to claims 1 or 2, wherein the stent is finished in one of the following ways: plating with a radiopaque material, plating with a protective material, embedding with medicine, or covering with a material.

21. A stent for widening a vessel in the human body comprising:
a plurality of first meander patterns;
a plurality of second meander patterns intertwined with the
first meander patterns to form triangular cells.

22. A stent according to claim 21 wherein the first meander
patterns are comprised of:

even first meander patterns; and

odd first meander patterns which are 180° out of phase with
the even first meander patterns, the odd first meander patterns
occurring between every two even first meander patterns.

23. A stent according to claims 21 or 22 wherein the second
meander patterns are comprised of:

even second meander patterns; and

odd second meander pattern occurring between every two even
second meander patterns.

24. A stent according to claim 21, wherein each of the
triangular cells is comprised of a first loop containing section,
a second loop containing section, and a third loop containing
section.

25. A stent according to claim 24, wherein the first loop

containing section is formed by a portion of a first meander pattern and the second and third loop containing sections are formed by portions of one or more second meander patterns.

26. A stent according to claim 24, wherein the first loop containing section includes at least one leg of a free loop which is shorter than other legs of loops in the loop containing section.

27. A stent according to claim 24, wherein the first loop containing section is wider than the second and third loop containing sections.

28. A stent according to claim 24, wherein the first meander pattern has two loops per period.

29. A stent according to claim 24, wherein the second meander pattern has four loops per period.

30. A stent according to claim 24 wherein the first and second meander patterns are substantially orthogonal.

31. A stent according to claim 24, wherein the first loop containing section has two loops facing toward the interior of

the cell.

21B 32. A stent according to claims 24 or 28, wherein the second and third loop containing sections each have two loops.

33. A stent according to claims 24, 28 or 32, wherein the loops of the second and third loop containing sections are adapted to compensate for the tendency of the loops of the first loop containing section to foreshorten when the stent is expanded.

34. A stent according to claim 24, 28 or 32, wherein one of the loops of the first loop section is a free loop which is shorter than the other loop of the first loop section.

35. A stent according to claims 24, 28 or 32, wherein the odd and even second meander portions have portions in common wherein said meanders run in the same direction.

36. A stent according to claims 24, 28 or 32, wherein the first and second meander patterns have portions in common wherein said meander patterns run in the same direction.

37. A multicellular stent for holding open a lumen, comprising:

a plurality of even and odd vertical meander patterns, the odd vertical meander patterns being located between every two even vertical meander patterns and being out of phase with the even vertical meander patterns,

a plurality of even and odd horizontal meander patterns, the odd horizontal meander patterns being located between every two even horizontal meander patterns,

wherein the vertical meander patterns are intertwined with the horizontal meander patterns to form a plurality of triangular cells.

38. A multicellular stent according to claim 37, wherein the triangular cells are formed by a first loop containing section, a second loop containing section connected to the first loop containing section, and a third loop containing section connected to the first and second loop containing section.

39. A multicellular stent according to claim 38, wherein the first loop containing section is formed from a portion of a vertical meander pattern.

40. A multicellular stent according to claim 39, wherein the

second and third loop containing sections are formed from portions of one or more horizontal meander patterns.

41. A multicellular stent according to claim 40, wherein members forming the first loop containing section are wider than members forming the second and third loop containing sections.

42. A multicellular stent according to claim 41, wherein the first loop containing section forms two loops facing toward the interior of the cell.

43. A multicellular stent according to claim 42, wherein the second loop containing section forms one loop facing toward the interior of the cell.

44. A multicellular stent according to claim 43, wherein the third loop containing section forms one loop facing toward the interior of the cell.

45. A multicellular stent according to claims 37, 38 or 44, wherein the stent is made of stainless steel.

46. A multicellular stent according to claim 45, wherein the first loop containing section includes one free loop.

47. A multicellular stent according to claim 46, wherein one leg of the free loop is shorter than the other leg of the loop.

48. A multicellular stent according to claim 47, wherein the length of the second loop containing section is equal to the length of the third loop containing section.

49. A multicellular stent according to claim 48, wherein each triangular cell of the stent encompasses the same area.

50. A multicellular stent according to claim 49, wherein the width of members forming the second loop containing section and the width of members forming the third loop containing section are the same.

51. A multicellular stent comprising;

a plurality of bands of first cells, each first cell including a first loop disposed generally longitudinally opposite a second loop and a first pair of flexible compensating members joined to the cell sections containing the first and second loop;

a plurality of bands of second cells, each second cell including a third loop disposed generally longitudinally opposite a fourth loop and a second pair of flexible members joined to the cell sections containing the third and fourth loops to form a

cell, the bands of second cells interspersed with the bands of first cells,

wherein the first loop and the second loop are substantially aligned along a longitudinal axis of the stent, and wherein the third loop and the fourth loop are offset along the longitudinal axis.

52. A multicellular stent according to claim 51 wherein the loops of the cell are wider than the flexible members of the cell so that the loops provide more radial support.

53. A multicellular stent according to claim 51 wherein each flexible member of the second pair of flexible members includes:

a first portion with a first end and a second end;

a second portion with a first end and a second end;

a third portion with a first end and a second end;

a curved portion with a first area of inflection disposed between the second end of the first portion and the second end of the second portion; and

a curved portion with a second area of inflection disposed between the first end of the second portion and the first end of the third portion.

54. A multicellular stent according to claim 53 wherein each

flexible member of the first pair of flexible members includes a flexible arcuate compensating member.

55. A multicellular stent according to claim 51, wherein the bands of the first cells alternate with the bands of the second cells.

56. A multicellular stent according to claim 51, wherein the the bands of the cells are chosen so as to produce sections of the stent with increased radial rigidity.

57. A multicellular stent according to claim 51, wherein the bands of cells at the ends of the stents are adapted to be more longitudinally flexible than the bands of cells in the remainder of the stent.

58. A multicellular stent according to claim 51, wherein the stent is made from either stainless steel or NiTi.

59. A multicellular stent comprising:

a plurality of bands of square cells, each square cell including a first loop disposed generally longitudinally opposite a second loop, and a first pair of flexible compensating members joined to the legs of the first and second loop;

a plurality of bands of triangular cells, each triangular cell comprising a first loop containing section arranged generally in the circumferential direction, a second loop containing section connected to the first loop containing section, and a third loop containing section connected to the first loop containing section and the second loop containing section,

wherein the bands of triangular cells are interspersed with the bands of square cells to form the stent.

60. A multicellular stent according to claim 59, wherein the bands of the square cells alternate with the bands of the triangular cells.

61. A multicellular stent according to claim 59, wherein the bands of cells at the ends of the stents are adapted to be more longitudinally flexible than the bands of cells in the remainder of the stent.

62. A multicellular stent according to claim 59, wherein the first loop containing section has two loops facing the interior of the cell.

63. A multicellular stent according to claim 59, wherein the

second and third loop containing sections each have at least one loop facing the interior of the cell.

64. A multicellular stent according to claim 59, wherein first and second loop are formed of members which are wider than the pair of flexible compensating members.

65. A multicellular stent according to claim 59, wherein the first loop is formed of members which are wider than members forming the second and third loop.

66. A multicellular stent according to claim 59, wherein the first loop containing section has some legs of loops which are shorter than other legs of loops.

67. An expandable stent comprising a plurality of enclosed flexible spaces, each of the plurality of enclosed flexible spaces including:

- a) a first member having a first end and a second end;
- b) a second member having a first end and a second end;
- c) a third member having a first end and a second end;
- d) a fourth member having a first end and a second end;

the first end of the first member communicating with the first end of the second member, the second end of the second member

communicating with the second end of the third member, and the first end of the third member communicating with the first end of the fourth member;

e) the first member and the second member with the curved portion at their ends forming a first loop;

f) the third member and the fourth member with the curved portion at their ends forming a second loop;

g) a fifth member having a first end and a second end;

h) a sixth member having a first end and a second end;

i) a seventh member having a first end and a second end;

j) an eighth member having a first end and a second end;

k) a ninth member having a first end and a second end;
and

l) a tenth member having a first end and a second end, the first end of the fifth member communicating with the second end of the first member, the second end of the fifth member communicating with the second end of the sixth member, the first end of the sixth member communicating with the first end of the seventh member, the second end of the seventh member communicating with the second end of the eighth member, the first end of the eighth member communicating with the first end of the ninth member, the second end of the ninth member communicating

with the second end of the tenth member, and the first end of the of the tenth member communicating with the second end of the fourth member;

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m) the fifth member and the sixth member with the curved portion at their ends forming a third loop;

n) the seventh member and the eighth member with the curved portion at their ends forming a fourth loop; and

o) the ninth member and the tenth member with the curved portion at their ends forming a fifth loop.

68. The stent of claim 67, wherein the first member, the third member, the sixth member, the eighth member, and the tenth member have substantially the same angular orientation to the longitudinal axis of the stent and the second member, the fourth member, the fifth member, the seventh member, and the ninth member have substantially the same angular orientation to the longitudinal axis of the stent.

69. The stent of claim 67, wherein at least one of the members in at least one of the plurality of spaces has a length that is greater than the length of the other members in that space.

70. The stent of claim 67, wherein at least one of the first, second, third, and fourth members in at least one of the

plurality of spaces has a length that is longer than the length of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members in that space.

71. The stent of claim 70, wherein at least one of the first, second, third, and fourth members in at least one of the plurality of spaces has a length that is about twice the length of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members in that space.

72. The stent of claim 67, wherein at least one of the first, second, third and fourth members in at least one of the plurality of spaces has a length that is substantially equal to the length of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members in that space.

73. The stent of claim 67, wherein the first, second, third, and fourth members in at least one of the plurality of spaces have a width that is different than the width of the fifth, sixth, seventh, eighth, ninth, and tenth members in that space.

74. The stent of claim 73, wherein the first, second, third, and fourth members in at least one of the plurality of spaces have a width that is greater than the width of the fifth, sixth,

seventh, eighth, ninth, and tenth members in that space.

75. The stent of claim 67, wherein at least one member in at least one of the plurality of spaces has a width that is greater than the other members in that space.

76. The stent of claim 67, wherein at least one member in at least one of the plurality of spaces has a width that is greater than the other members in that space.

77. The stent of claim 69, wherein at least that member having the greatest length in that space is joined to an adjacent member which extends in an adjacent space.

78. The stent of claim 67, wherein a substantial portion of each of the members is substantially straight.

79. The stent of claim 67, wherein the members are comprised of metal.

80. The stent of claim 79, wherein the metal is selected from the group consisting of stainless steel and nitinol.

81. The stent of claim 67, wherein the first, second, third, and

fourth members and the fifth, sixth, seventh, eighth, ninth, and tenth members are provided with different flexibilities with respect to each other.

82. The stent of claim 81, wherein the first, second, third, and fourth members are more flexible than the fifth, sixth, seventh, eighth, ninth, and tenth members.

83. The stent of claims 81, wherein the fifth, sixth, seventh, eighth, ninth, and tenth member patterns are more flexible than the first, second, third, and fourth members.

84. The stent of claim 67, wherein at least one portion of at least one of the first, second, third, and fourth members and at least one portion of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members are provided with different flexibilities with respect to each other.

85. The stent of claim 84, wherein at least one portion of at least one of the first, second, third, and fourth members is provided with at least one portion that is more flexible than at least one portion of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members.

86. The stent of claim 84, wherein at least one portion of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members is provided with at least one portion that is more flexible than at least one portion of at least one of the first, second, third, and fourth members.

87. The stent of claim 67, wherein the first, second, third, and fourth members and the fifth, sixth, seventh, eighth, ninth, and tenth members are provided with different resistances to radial compression with respect to each other.

88. The stent of claim 87, wherein the first, second, third, and fourth members have a greater resistance to radial compression than the fifth, sixth, seventh, eighth, ninth, and tenth members.

89. The stent of claims 87, wherein the fifth, sixth, seventh, eighth, ninth, and tenth members have a greater resistance to radial compression than the first, second, third, and fourth members.

90. The stent of claim 67, wherein at least one portion of at least one of the first, second, third, and fourth members and at least one portion of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members are provided with different

resistances to radial compression with respect to each other.

91. The stent of claim 90, wherein at least one portion of at least one of the plurality of the first, second, third, and fourth members is provided with at least one portion that has a greater resistance to radial compression than at least one portion of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members.

92. The stent of claim 90, wherein at least one portion of at least one of the fifth, sixth, seventh, eighth, ninth, and tenth members is provided with at least one portion that has a greater resistance to radial compression than at least one portion of at least one of the first, second, third, and fourth members.

93. A stent comprising a matrix of cells, substantially as depicted in any of Figures 3, 4, 5, 6, 7, 9 or 11.

94. A stent comprising a matrix of cells, wherein the cells are selected from one or more of the cells substantially as depicted in Figures 3, 4, 5, 6, 7, 9 or 11.

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